Annex D: Other Useful Information

D1: GM 2021 Platinum Standards

	GM 2021 Platinum
Chiller plant system efficiency (kW/RT)	0.56
Air side efficiency (kW/RT)	0.18
Total AC system efficiency (including water side and air side) (kW/RT)	0.74
Lighting (W/m²)	
- Office/Meeting Room	5.5
- Hotel Guest Room	7.0
Mechanical Ventilation (W/CMH)	
> 4kW	0.28
< 4kW	0.17
Reduced Heat Gail (ETTV) (W/m²)	
- Office Building	38
- Hotel	40

D2: Technology Readiness Level Descriptions

Technology Readiness Level (TRL) is widely used indictor of degree of development or a technology toward deployment on a scale of 1-9.

Level	Definition	Description
TRL 1	Basic principles observed and reported	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties or experimental work that consists mainly of observations of the physical world.
TRL 2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be formulated. Applications are speculative and there may be no proof or detailed analysis to support the assumptions. Examples are limited to analytic studies.
TRL 3	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative tested with simulants.
TRL 4	Component and/or system validation in laboratory environment	The basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system.
TRL 5	Laboratory scale, similar system validation in relevant environment	The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Examples include testing a high-fidelity, laboratory scale system in a simulated environment.
TRL 6	Engineering/pilot-scale, similar (prototypical) system validation in relevant environment	Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in simulated operational environment.
TRL 7	Full-scale, similar (prototypical) system demonstrated in relevant environment	Prototype near or at planned operational system – Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment.
TRL 8	Actual system completed and qualified through test and demonstration.	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development.
TRL 9	Actual system operated over the full range of expected conditions.	The technology is in its final form and operated under the full range of operating conditions.

D3: Possible Solutions (non-exhaustive)

- Non-vapour compression technologies that provide cooling without the use of hydrofluorocarbon (HFC) refrigerants and have more significant energy savings potentials over conventional technologies.
- Integrated advanced dehumidification system with evaporative cooling
- Flexible ventilation systems that allow optimum shift between different modes of operation (e.g. energy saving mode vs epidemic/endemic mode).
- Grid interactive efficient building solutions capable of effectively managing multiple Distributed Energy Resources and to co-optimise demand flexibility for the grid and building owners and occupants to improve building Energy Efficiency (EE) and support better integration of renewable energy, energy storage, etc. through smart technologies like advanced sensors and controls and data analytics.
- Smart building solutions capable of effectively managing interoperability and integration across different smart systems and building sub-systems to optimise energy performance and IAQ.
- Hybrid cooling and ventilation solutions combining various possible combination of multiple modes of hybrid air-con, natural ventilation, assisted ventilation system, to achieve optimal EE and thermal comfort and health.
- Smart occupant ventilation systems integrated with AI to provide adaptive cooling and ventilation to reduce the energy consumption of air-conditioning systems based on occupancy conditions, outdoor weather and real time health parameters
- Air cleaning technology for ACMV load reduction (remove carbon dioxide, ozone, formaldehyde, and a wide range of Volatile Organic Compounds (VOCs) from indoor air so that ventilation rates can be optimized to improve energy efficiency and IAQ, which can lead to reductions in ACMV equipment costs, operating costs, and buildings' carbon emissions.)
- Smart ventilation systems to optimize the building’s climate for the next days based on the weather forecast.
- High energy efficient air filtration system capable of deactivation of micro-organisms, prevention of microbial growth in the filter, with less frequent service
- Use advanced technologies that have energy recovery including within the technology. For example, Heat pump and HVAC technologies, that have heat recovery options.